

SECTION 34 21 19
SEPARABLE INSULATED CONNECTOR

PART 1 – GENERAL

1.01 SECTION INCLUDES

- A. Separable Insulated Connector Assembly
- B. Elbow Termination Box
- C. Existing Switchgear Cable Termination & Bus Modifications

1.02 MEASUREMENT AND PAYMENT

Not Used

1.03 REFERENCE STANDARDS

- A. Association of Edison Illuminating Companies (AEIC):
 - 1. AEIC CS8-07 Specifications for Extruded Dielectric, Shielded Power Cables Rated 5 through 46kV
- B. American National Standards Institute (ANSI):
 - 1. ANSI C119.4 Copper and Aluminum Conductor Connectors
- C. Insulated Cable Engineers Association (ICEA):
 - 1. ICEA S-94-649 Concentric Neutral Cables Rated 5 – 46kV
- D. Institute of Electrical and Electronics Engineers (IEEE):
 - 1. IEEE 386 Separable Insulated Connector System for Power Distribution Systems Above 600V
 - 2. IEEE 404 Cable Joints for Use with Extruded Dielectric Cable Rated 5000 through 46000 Volts, and Cable Joints for Use With Laminated Dielectric Cable Rated 2500 Through 500000 Volts.
- E. State of California
 - 1. CEC California Electrical Code, CCR, Title 24, Part 3

1.04 SUBMITTALS

- A. General: Refer to Section 01 33 00, Submittal Procedures, and Section 01 33 23, Shop Drawings, Product Data, and Samples for submittal requirements and procedures.
- B. Shop Drawings: Submit the following shop drawings:
 - 1. Separable Insulated Connector section details for materials and assembly construction.
 - 2. Connector and cable terminations showing cross sections and installation details.
 - 3. Installation details for the Elbow Termination Boxes/Enclosures showing overall dimensions and clearances, U-Channel support details, mounting details, cable routing and outline dimensions and tolerances, installation details, and grounding installation details.
- C. Product Data: Submit data for separable insulated connector assembly and associated materials including junction bars, connectors, insulated bushing with standard brackets, protective caps with drain wires, special installation tools, and accessories. Product data shall include product description and detailed technical specifications.
- D. Samples
 - 1. Provide one (1) sample of each type of separable insulated connector assembly that includes the connector (plug), junction bar with the parking stand, and grounding components.
 - 2. Samples shall be labeled with the following data: name of the manufacturer, type/model, size, voltage rating, insulation, application, and use.
 - 3. Before submitting the sample, ensure that the product will be available in the quantities required for the Contract. No change or substitution will be permitted after submittal of the samples.
 - 4. Product incorporated in the work shall match the approved samples.
- E. Submit product test program plan, procedures, and reports in accordance with Section 01 45 24, Testing Program Requirements. Manufacturer shall certify factory design and production test reports indicating compliance of connector assemblies and enclosures with referenced Standards and these specifications.
- F. Assembly, Installation, Termination / Connection, and Testing Manuals:
 - 1. Provide a detailed written narrative describing the installation, termination / connection methods, manufacturer recommended field testing procedures and maintenance instructions for the separable insulated connector assembly to be furnished. Drawings, sketches, part numbers, sources of all special tools, gauges, and handling equipment required, and other pertinent information shall

be included in the manual. Manual format and contents shall conform to the requirements for Operation and Maintenance Manuals as defined in Section 01 78 23, Operation and Maintenance Data.

2. Draft versions of the manuals for the separable insulated connector assembly shall be submitted for approval. Final versions of manuals shall be submitted 30 Days after receipt of District's comments and not less than 60 Days prior to connector installation in the field.
3. The manual shall include at a minimum the following:
 - a. Site storage instruction including handling and storage requirements for short and long term;
 - b. Installation equipment checklist, equipment set-up with diagram, illustrations, and sketches;
 - c. Connector terminations and connections to 34.5kV EPR cables.
 - d. Instrumentation and procedures for field testing after connection to cables and termination to the junction bars.

1.05 SUPPLIER QUALIFICATIONS

- A. The manufacturer of the connector assembly and the box shall furnish a certification proving a minimum of five (5) years business experience.
- B. The connector assembly shall consist of proven standard products or equivalent to the standard products of manufacturers engaged in the production of such components for at least the past five years.
- C. Submit for District approval, a certificate of experience for each engineer and technician that will perform installation work. Experience cited for each shall include performance during the immediate past three years in connector installation / termination to medium voltage cables of the type specified herein. Certifications for termination / connection experience shall be issued by the separable insulated connector assembly manufacturer.

1.06 DELIVERY, STORAGE, AND HANDLING

- A. The Elbow Termination Box/Enclosures including factory and loose components shall be weatherproofed for shipment. Connection openings shall be closed to prevent entrance of foreign material during shipment and storage.
- B. The termination boxes and loose components shall be handled and stored in conformance with manufacturer's procedures and instructions. One copy of these procedures and instructions shall be included with the boxes and components at the time of shipment.
- C. Submit manufacturer's delivery, storage, and handling (loading and off-loading) procedures and instructions 60 Days prior to shipment.

PART 2 – PRODUCTS

2.01 SEPARABLE INSULATED CONNECTOR ASSEMBLY

- A. General: Separable insulated connector assembly shall be provided for the new 34.5kV power circuit. The connector assembly shall be factory mounted and housed in an enclosure. Two types of connector assembly enclosures shall be provided. One enclosure shall be suitable for aerial installation and the other enclosure shall be a free standing type for at grade installation. The Elbow Termination Box/Enclosure is specified herein article 2.01C.
- B. Separable Insulated Connector Assembly
1. Separable insulated connector system shall consist of in-line and Y-splice junction bars, bushing wells, bushing inserts, elbow and straight connectors (Plugs), grounding elbows, parking stands, mounting brackets and accessories.
 2. The connector system shall be submersible, made of vacuum cast resin, as manufactured by Cooper Power Systems or Thomas & Betts or equal, and shall meet all the requirements of IEEE 386.
 3. Elbow connector assembly shall be 35 kV, 200A loadbreak type and provided with test point and operating eye, and straight connector assembly shall be 600A deadbreak type.
 4. Both elbow and straight connector assemblies shall be sized for 250 kcmil EPR shielded cable
 5. The 200A loadbreak elbow connector assembly shall be rated for 150 kV BIL, 50 kV AC one minute withstand, 103 kV DC 15 minute withstand, 26 kV Corona Extinction, 10 kA rms symmetrical for 0.17 second and 3.5 kA rms symmetrical for three seconds.
 6. The 600A deadbreak straight connector assembly shall be rated 600A rms continuous, 1 kA rms for 24 hour overload, 25 kA rms symmetrical for 0.17 second and 10 kA rms symmetrical for three seconds.
 7. The connector assembly shall have an electrically conductive shield and shall have provision for connecting an external ground to the shield.
 8. Junction bars shall be provided with three or four elbow interfaces and parking stands as shown on Contract Drawings.
 9. For phase one only, one additional bushing well, bushing insert and an elbow connector shall be provided for the existing potential transformer cable.
 10. One grounding elbow connector per phase shall be provided for the existing grounding cables.

11. Elbow connector assembly shall be operable by means of a suitable live-line hotstick tool that clamps the elbow so that operation is along the probe axis. One hotstick shall be provided for each substation.
12. Provide one set of special tools for each substation, required for operation, testing and maintenance.

C. Elbow Termination Box/Enclosure for At-Grade Mounting Installation

1. Elbow Termination Box/Enclosure with factory installed connector assemblies: Provide a free standing elbow termination box sized as indicated on the drawings. Each box shall have factory installed connector assemblies as indicated in the drawing and specified in Article 2.01.B.
2. Enclosure Construction: The enclosure shall be of preformed galvanized steel channels, angles, and side sheets braced and welded together to form an outdoor, free standing NEMA 3R metal enclosure, with ventilated front double hinged doors, base, and roof sections. Access doors shall be flanged and shall close against rubber or similar gasketing material. Ventilated openings shall be provided with filtered covers and screened vents for protection against the weather and insects. Doors shall be equipped with latch, stops, and door-locking mechanism and with padlock provisions. The roof section shall be unit construction with openings for six-inch conduit hubs and connected six-inch expansion/deflection flex conduits for top cable entry. The enclosure shall form a rigid structure free of mechanical vibration and shall have steel channels or unistruts to mount the connector assembly junction bars and associated components. The base frame shall be provided with mounting holes to allow anchorage to concrete. The enclosure shall be provided with grounding studs for equipment grounding purposes. The interior and exterior surfaces of the enclosure shall be primed and finish painted. The enclosure inside finish color paint shall be white and the outside finish color paint shall be gloss finish Munsell No. 2.5 G8/4 or equal. A nameplate shall be provided in the front of each enclosure.
3. The finished elbow termination enclosure shall be qualified by testing or calculation that it meets the seismic requirements in CBC 2007.

D. Grounding:

1. Provide isolated ground bus and lugs within T-Tap and Elbow Termination enclosures and ground each cable concentric neutral. Provide separate ground lug for 3/0 AWG ground wire and connect to existing switchgear system ground bus

PART 3 – EXECUTION**3.01 CABLE TERMINATION IN EXISTING SWITCHGEAR ENCLOSURE MODIFICATIONS:**

- A. Modify the existing enclosure walls and internal copper buses as shown on Contract Drawings.
- B. Remove existing porcelain insulators as shown.
- C. Replace old potheads for pipe cables with new bushings for incoming/outgoing EPR cables. To prevent water seeping into the termination enclosures, bushings shall seal the EPR cables tight and sealant shall be used between bushings and the enclosure roof openings.
- D. Stainless steel nuts and bolts shall be used for mounting the junction bars and on the enclosure walls with the nuts installed on the inside of the walls. Paint the bolt heads to match existing enclosure color.

3.02 ELBOW BOX INSTALLATION:

- A. Install and secure Elbow Box Assembly and Enclosure in accordance with civil and seismic requirements.
- B. Route new 34.5kV cables and conduits from the 34.5kV circuit and from substation switchgear to Elbow box enclosure in accordance with civil and seismic requirements.
- C. Connect grounding cables from enclosure, elbow assembly, and cables to common grounding bar in the Elbow Box enclosure.

3.03 FIELD TESTING:

- A. Install and field test Elbow Termination Boxes completely assembled and equipped with the Separable Insulated Connector Assembly as indicated.

3.04 TESTING:

- A. General: Testing shall be performed in accordance with Section 01 45 24, Testing Program Requirements.
- B. Factory Testing:
 - 1. Separable Insulated Connector Systems:
 - a. The following production tests shall be performed in accordance with IEEE 386 by the manufacturer on all connector components, except ground bushings and grounding elbows:
 - 1) Corona voltage level.

- 2) AC withstand or full-wave impulse withstand voltage.
- 3) Test point voltage test.
- b. The design tests listed in Table 4 of IEEE 386 shall be performed by the manufacturer to demonstrate compliance of the design with the standard. In lieu of performing the actual tests, certified test results of previous design tests of identical connector components are acceptable.

END OF SECTION 34 21 19